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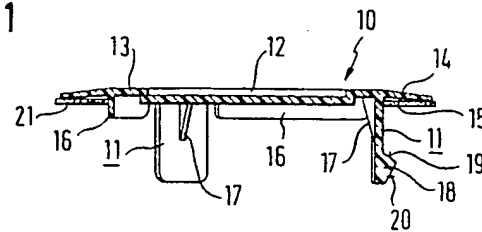
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(54) Covers for closing openings in
sheet material

(57) A cover for closing an opening in sheet material, such as sheet metal, especially a paint outlet opening in an automobile body panel, comprising a one-piece body 10 of high temperature resistant synthetic material and a separate ring 21 formed of fusion type adhesive, the body 10 having a circumferential rim 14, and resiliently deflectable legs 11 with outwardly pointing arresting projections 18 which are intended to pass through the opening, the ring 21 being loosely assembled on the body 10 in a manner such that the ring 21 can contact the rim 14, and the ring 21 being retained on the body 10 by the legs 11.

FIG.1



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FIG.1

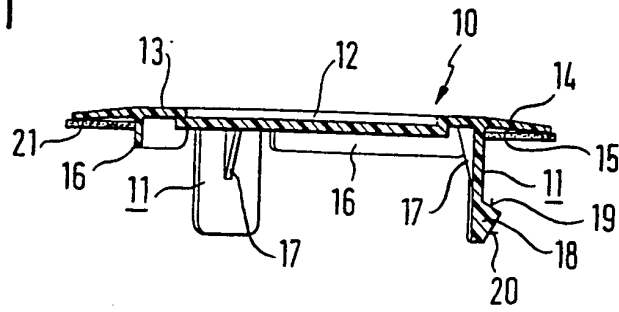


FIG.2

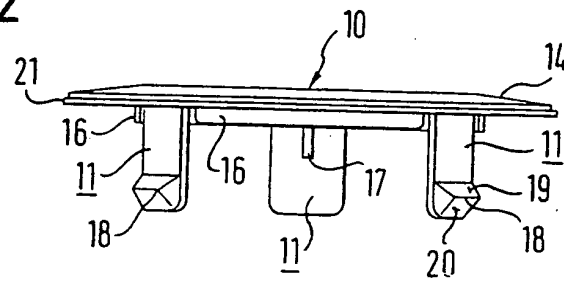
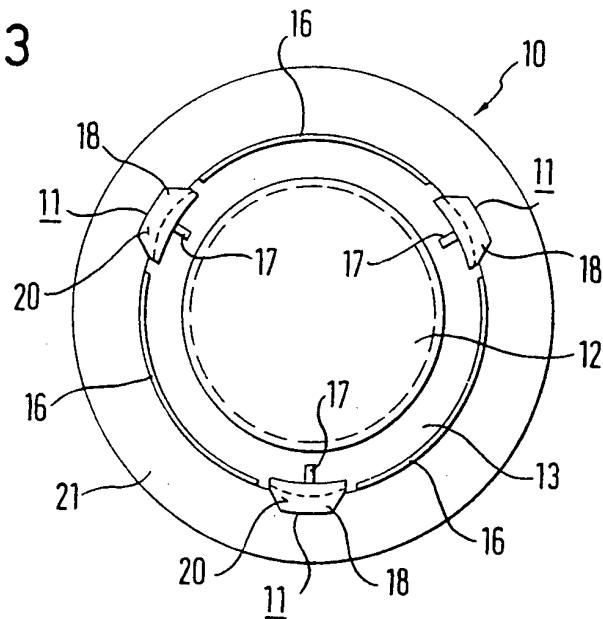


FIG.3



SPECIFICATION

A cover for closing an opening in sheet material

5 The present invention relates to a cover for closing an opening in sheet material, such as sheet metal, especially a paint outlet opening in an automobile body panel.

It is known from GB 1 466 563 to provide a plug 10 having a circumferentially and outwardly extending rim which is not intended to pass through the opening, and further having resiliently deflectable legs with outwardly pointing arresting projections which are intended to pass through the opening.

15 The plug is formed of thin sheet steel. In one embodiment, a ring of fusion type adhesive is first pushed loosely over the legs and is then attached firmly to the rim, either with the aid of a lip on the ring or by the use of an adhesive.

20 This known arrangement suffers from several drawbacks. During assembly, damage may be caused to or by the metallic plug owing to sharp edges. A particularly aggravating disadvantage resides in the danger of corrosion. The legs may 25 form a sort of rust bridge which may prove to be especially disagreeable in the technical field of automobile construction. Finally, the attachment of the ring to the rim requires an additional operational step which decisively adds to the manufacturing expenditure for a relatively simple construction.

It is also known from our own GB 1 511 404 to apply a sticky or contact adhesive to a fusion type adhesive layer on the rim of a cover formed of a 35 high temperature resistant synthetic material. It is possible with the aid of the sticky adhesive to fix the cover in a simple manner across a sheet metal opening without having to exert a particularly high amount of energy. The cover is not formed with 40 any resiliently deflectable legs for snap engaging in the sheet metal opening. On the other hand, however, it may happen during use that the cover is not applied centrally relative to the sheet metal opening, and this may lead to a lack of neatness 45 when rows of the covers are to be applied.

An aim of the present invention has been to provide a cover which is of simple design and is simple to manufacture and yet may be securely mounted in a simple manner.

50 According to the present invention, a cover for closing an opening in sheet material, such as sheet metal, especially a paint outlet opening in an automobile body panel, comprises a body formed in one piece of high temperature resistant synthetic 55 material and a ring formed of fusion type adhesive as a separate member, the body having a circumferentially and outwardly extending rim which is not intended to pass through the opening, and further having resiliently deflectable legs with outwardly pointing arresting projections which are 60 intended to pass through the opening, the ring being loosely assembled in the body in a manner such that the ring can contact the rim, and the ring being retained on the body by the legs.

65 The ability of the projections on the legs to en-

gage behind the edge of the opening makes possible a preliminary relatively centric application to the opening. There is no danger of any damage during this application. Above all, due to the one piece configuration of the body of synthetic material, corrosion in this region is completely eliminated.

The ring is preferably manufactured in an injection moulding process. It is pushed over the legs 70 of the body and is retained thereby. At the time of preliminarily assembling onto the legs, and until the final insertion into the opening, therefore, there is little danger of these parts getting separated from each other.

80 Preferably, axially extending flanges are formed between the legs, thereby providing an effective limitation of flow to prevent too much of the fusion type adhesive material exiting via the opening, when becoming molten in for example a paint 85 oven.

Preferably, an outer diameter of the rim is slightly less than an outer diameter of the ring, thereby permitting the fusion type adhesive material to flow when molten against the circumferential edge of the body, to further improve the 90 sealing effect.

Preferably, the rim is slightly conical such that the loosely assembled ring can contact an outer region of the rim. During fusing, a flow limitation is 95 imposed on the molten material by the outer region of the rim, the molten material thus accumulating predominantly at the inner region of the rim and forming an uninterrupted annular sealing region.

100 Although it has been convenient to refer to a ring, it is not necessary for the ring to be circular. The ring may adopt any shape, usually generally complementary to the shape of the opening, and may for example be of generally oval, rectangular or square shape. Naturally, the rim will usually be 105 of complementary shape to both the ring and the opening. The terms diameter and conical, as used both herinbefore and hereinafter, should thus be understood as being the corresponding terms used 110 in connection with different shapes, and not be restricted to just the circular shape. It is convenient to mention here that the outside of the legs, and the axially extending flanges if present, preferably adopt the shape of the opening when considered 115 together.

A cover, in accordance with the present invention, will now be described, by way of example only, with reference to the accompanying drawings, in which:-

120 *Figure 1* shows a sectional view of the cover; *Figure 2* shows a side view of the cover; and *Figure 3* shows a bottom plan view of the cover.

Prior to enlarging on the individual representations shown in the drawings, it has to be stated 125 that each of the features described is of inventively essential importance by itself or in connection with features of the claims.

The cover shown in Figures 1 to 3 comprises a body 10 including a generally plate-shaped portion 130 having integrally formed on the underside thereof

three resiliently deflectable or spring legs 11 in uniformly spaced circumferential arrangement. The plate-shaped portion, the periphery of which is circular, comprises a central circular recess 12 surrounded radially by an annular portion 13. The bottom of the recess 12 and the annular portion 13 extend in parallel and are approximately of the same thickness. Surrounding the annular portion 13 is a portion in the form of a circumferentially and outwardly extending tapered rim 14. Both the upper surface and the underside 15 of the rim 14 extend at an angle to the annular portion 13 so that the rim 14 is slightly conical.

Formed integrally on the underside of the annular portion 13, in the outer region thereof, are three flanges 16 which extend axially, i.e. at right angles to the annular portion 13, each of the flanges 16 being located between a respective pair of the legs 11.

The outer surface of each of the legs 11 is shown in the dotted lines in Figure 3. The radial extent of the legs 11 coincides in the centre thereof with the outer radius of the flanges 16. The legs 11 are reinforced on the inner surfaces thereof by ribs 17 which are formed integrally with the underside of the bottom of the recess 12. Towards the free ends thereof, each of the legs 11 is provided with an outwardly projecting nose 18 having an upper conical arresting surface 19 and a run-in surface 20 extending approximately at right angles with respect to the arresting surface 19. The run-in surface 20 of each of the noses 18 is likewise provided with an arcuate contour, in order to be able to insert the cover into a sheet metal opening in a simple manner. In this operation, the legs 11 will temporarily slightly deform inwardly, until the noses 18 snap behind the opening edge and the arresting surfaces 19 come to lie against the opening edge.

The body 10 is formed in one piece of a high temperature resistant synthetic material.

A separate relatively thin ring 21 of fusion type adhesive material, which may be made in an injection moulding process for example, has an inner diameter which is but slightly greater than the outside diameter of the flanges 16. Its outer diameter is slightly greater than the outer diameter of the rim 14.

Before the cover is installed across the opening, the ring 21 has been pushed onto the legs 11 and can contact an outer region of the rim 14. It is retained on the body 10 and centered by the legs 11. Achieving this loose assembly is extremely simple.

Achieving application of the cover to the sheet metal opening is also extremely simple. It is only necessary to press the body 10 by one's finger or thumb, until the noses 18 of the legs 11 snap behind the opening edge. The mechanic hears this noise and may thereby satisfy himself that the cover is secure. The recess 12 affords the finger and the thumb, respectively, sufficient support in this operation, in order to be able effectively to press the cover into the opening. The ring 21 is effectively centered by the legs 11 and the flanges 16 so that, during the subsequent fusion, perhaps in a paint annealing furnace, a uniform distribution of

the molten fusion type adhesive takes place with effective sealing around the entire circumference of the rim 14. The portion of the ring 21 projecting radially beyond the rim 14 is effective to bring about an embedding of the outer edge of the rim 14 in the fusion type adhesive.

CLAIMS

1. A cover for closing an opening in sheet material, such as sheet metal, especially a paint outlet opening in an automobile body panel, comprising a body formed in one piece of high temperature resistant synthetic material and a ring formed of fusion type adhesive as a separate member, the body having a circumferentially and outwardly extending rim which is not intended to pass through the opening, and further having resiliently deflectable legs with outwardly pointing arresting projections which are intended to pass through the opening, the ring being loosely assembled on the body in a manner such that the ring can contact the rim, and the ring being retained on the body by the legs.

2. A cover according to claim 1, in which axially extending flanges are formed between the legs.

3. A cover according to claim 1 or claim 2, in which an outer diameter of the rim is slightly less than an outer diameter of the ring.

4. A cover according to any one of the preceding claims, in which the rim is slightly conical such that the loosely assembled ring can contact an outer region of the rim.

5. A cover substantially as hereinbefore described with reference to the accompanying drawings.

Amendments to the claims have been filed, and have the following effect:-

(a) Claim 1 above has been deleted or textually amended.

(b) New or textually amended claims have been filed as follows:-

(c) Claims 4 and 5 above have been re-numbered as 5 and 6.

1. A cover for closing an opening in sheet material, such as sheet metal, especially a paint outlet opening in an automobile body panel, comprising a body formed in one piece of high temperature resistant synthetic material and a ring formed of fusion type adhesive as a separate member, the body having a circumferentially and outwardly extending rim which is not intended to pass through the opening, and further having resiliently deflectable legs with outwardly pointing arresting projections which are intended to pass through the opening, the ring being loosely assembled on the body in a manner such that the ring can contact the rim, the ring having caused the arresting projections on the legs to deflect resiliently inwards during assembly of the ring onto the body and the ring then being retained on the body by the arresting projections on the legs.

4. A cover according to claim 2, and claim 3, in

which the legs and the flanges are both formed integrally at first ends thereof with a central portion of the body, the arresting projections on the legs lying in a plane spaced axially further from said
5 central portion than a plane containing the other ends of the flanges.

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